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CANAL DOCUMENTS.

To the Board of Canal Commissioners of the State of Pennsylvania.

Agreeably to instructions, communicated by the Secretary of the Board, in June last, I repaired to the western part of the state, immediately after the general examination of the military academy, for the purpose of reconnoitering and surveying (as far as time would permit) the routes of the N. W. section of the Pennsylvania canal, from the waters of French creek to the bay of Presque Isle.

The first of those routes to which my attention was directed, was that by the way of Conneaut Lake and the Valley of the Big Conneaut, upon which, having now completed the necessary plans and calculations, I have the honour of submitting the following report.

The operations of the survey commenced, of course, at Conneaut Lake, and had, for their first object, the determination of the various questions connected with the summit level.

Reverting to the report of last year, on the subject of the French creek feeder, it will be recollected that the dividing ridge between the waters of Conneaut Lake and those of Lake Erie pass at a moderate elevation within a few miles north of the former, and that among the various routes for crossing it, that by the east branch of Beaver Dam run is designated as the most favourable. Having fully satisfied myself on this point, on the former occasion, it only remained, with reference to this point of the route, to examine the ground a little more in detail. The experimental line, for this and other purposes of the survey, was commenced at the surface of the Conneaut Lake, near the mouth of Beaver Dam run, and carried on the eastern side, generally as near it as was consistent with the accuracy of the level, to the height of land near Grier's Improvement, on the road west of Brightstown. Crossing the ridge at this point, and taking advantage of one of the tributaries of the Big Conneaut, the line was restored almost immediately to the level with which it commenced, at the surface of Conneaut Lake. This brief operation being sufficient, in addition to the work of last year, for determining the route and mode of construction on the summit level, the line was continued, without delay, down the Valley of the Big Conneaut. From the impression I had received of the character of this valley, and the nature of the ground in a direction towards Erie, I was led to believe that very important advantages would be gained, in point of distance and facilities of construction, by keeping the level as long as possible at the full elevation of the summit level, and the survey was conducted accordingly, along the eastern slope of the valley. At first, for a considerable distance on the line thus explored, the features of the ground harmonized very well with this plan; but, as the line gradually gained upon the surface of the slope, the difficulties greatly increased; and, at length, when the party had proceeded as far as the east Branch of Big Conneaut, it became quite evident that the impediments already encountered, together with those fairly to be calculated upon in proceeding, would more than outweigh any advantages that could possibly be derived from the choice of this route. In coming to this conclusion, and abandoning the line which had been so far advanced, I should have gone back to the vicinity of the dividing ridge and brought down a new line through the bottoms of the valley had time permitted:—As the case was, I went back about six miles on my line and made an offset, contenting myself with connecting this work with that at the head of the valley by a line carefully run with the compass.

Upon examining the ground in the vicinity of the Forks of the Big Conneaut, and forward as far as Elk creek with the view of adjusting the level and direction of the new line, it was found, with few exceptions, unexpectedly favourable. A bench of smooth uniform ground presenting itself on nearly five miles of the direct route toward Elk creek, and at a sufficiently low level to admit of shunning the chief difficulties of the Conneaut valley. In this direction, therefore, the line was brought by the sources of Crooked creek to the valley of Hall's run, and so, by a rapid descent, into the bottom of that valley and the great valley of Elk creek. The crossing of this stream having generally been considered as one of the principal difficulties on this route, it became necessary to explore it with particular care. Several days were accordingly employed in examining the character of the valley, and in levelling and measuring at the different points selected as crossing places.—Every thing being at length ascertained, upon which the comparison of these crossings could at all depend, the experimental line was continued across the creek, and down the eastern side of the valley of the village of Fairview. At this point the ground was explored with a view of reaching, by the most direct and convenient route, a level bench of land which ranges with great uniformity towards Erie, along the north side of, and a little below the Ridge road. Having satisfied myself on this point, the operations of the surveys were continued, without further hindrance, to the banks of Walnut creek.

The crossing of Walnut creek is another of the difficulties of this route, but of a very different character from the one first mentioned. It presents, indeed, a wide and deep chasm with very precipitous banks, which evidently cannot be passed without an expensive construction; but the face of the adjacent country is perfectly regular, and the level well preserved to the edge of the precipice on both sides; so that the crossing, so far as regards the adjustment of the route and the plan of construction, is reduced to a very simple case. Only a few hours were required to complete the examinations at this place, and transfer the level to the east side of the creek, after which the line was resumed and continued upon the same bench, and at the same average level as before. Every thing proved remarkably favorable on the residue of the distance to Erie, and it only remained to explore the ground in that vicinity, for the lockage down to the surface of the lake. This was accomplished, on the 18th of August, and with it the field duties of the party on this route were considered at an end, having occupied exactly five weeks from the time of their commencement at Conneaut Lake.

Having thus given a view of the operations of the survey, I proceed to notice, more particularly, the character of the route and the nature of the various constructions connected therewith.

Section 1.—*The Summit Level.*

The discussion under this head, to be final, should

evidently embrace the connexion of the summit level with the routes down the southern slope; but, as those are made the subject of separate surveys, not yet reported upon, I can only at present consider the route under discussion in its relation to the French creek feeder. The feeder, it will be recollected, was considered in my last year's report as terminating in the vicinity of the outlet bridge near Cummings' tavern, and at the level of eight feet above the habitual surface of Conneaut Lake:—At that point, therefore, (marked A. in the accompanying maps.) I take the commencement of the present line. An easy inflection carries it across the tongue of land on the west side of the outlet, and through a small portion of the lake to the western shore; it then skirts along the firm bank of that shore, and, in a very even course, by means of a few trifling excavations and embankments, until it passes Wolf Point, after which it changes slightly to the left, as the ground suits, and passing directly up the Beaver Dam swamp, falls into the course of the run a little south of Lewis' Hill. Near this point, (marked B. in the maps,) the deep cutting commences; the line in the mean time passes by the bed of the stream, round the west side of the hill, and thence in a direct course through the swamp, to the bench-mark, (at station No. 49,) on the dividing ridge. About 100 yards beyond this, continuing the same direction, it strikes a head water of the Big Conneaut in the general course of which it descends, to the station No. 55, marked C.) where the cutting again runs out at the surface of the ground.

The construction on this line consists, for the most part, of mere excavation and embankment, and requires no particular remark, except as regards its connexion with Conneaut Lake. In the provisional examination of this summit, it is well detailed in the former report. The only view taken of this connexion, in the event of the canal passing on the west side of the lake, was by damming the latter to the eight feet level, and merely constructing a towing path along the western side. This was believed to be the most natural construction, and as converting the lake into a reservoir, to afford some security against the possible failure of a supply from French creek. The examinations of the present year, however, have shown so considerable a supply of water, from the springs and brooks of the northern slope, as to render this plan entirely unnecessary as a measure of precaution, while they afford also some reason to doubt its feasibility in other respects, in comparison with a separate construction. There are nearly 600 perches of the route above described which it appears will require embankment, from four to ten feet entire height. Now, in the first place, a simple embankment of this extent, exposed to the action and agitations of the lake, will be far more liable to accident than a canal embanked in the ordinary way and the consequences of a breach, besides that it will produce a much longer intermission to the navigation, will be more disastrous in every respect.

2dly. This mode of construction will cover a large extent of low ground at the head of the lake, with a thin sheet of stagnant water, the effects of which can hardly fail of being injurious to the health of the vicinity, and will also produce a considerable increase in the assessment of land damages.

Thirdly, the navigation if unprotected on the side of the lake, will be less safe and convenient than an extraordinary canal, and if so protected, the expense of construction will be decidedly in favor of the latter. Fourthly, no advantage will be gained, in any event, in point of expense; for it is found by a careful estimation of both modes, that by giving proper attention to the construction of the dams, and including those at the foot of the lake, formerly estimated, the plan of raising the lake will cost from 500 to 1000 dollars more than the construction of a separate canal. Should the locating engineer, with the results of the southern surveys before him, agree with me in these opinions, he will cross the outlet by a culvert at Cummins', and make the whole line entirely independent of the lake. Upon supposition therefore, I have made my estimate. The length of this section from the guard gate near Cummins' is 5 miles and 213 perches, 695 moderate embankment and the remainder excavation, generally moderate, and only 22 feet entire depth on the dividing ridge.

Second Section, down the valley of the Big Conneaut.

In detailing the field operations of the survey, I have already given some idea of two widely different modes, by which the canal may be conducted down this valley. First by keeping the level of the summit along the face of the eastern slope, and secondly, locking down through the bottom of the intervale. The first of these was the plan upon which I commenced under the expectation of being able to shape my course more directly towards Erie, and of obtaining more convenient crossing places for the much dreaded valleys of Elk and Walnut creeks, the particular circumstances which induced me to abandon it in favor of a route down the bottom of the valley. I have now to remark, with respect to the valley itself, its lateral slopes were found remarkably intersected by ravines and gullies, produced in some instances by permanent streams, and in others, by the occasional wash of the country. These generally proceed from small beginnings at the distance of a mile or two from the margin and run out again to terminations equally small in the valley, but in the intermediate distance, and particularly at the verge of the slope, they have frequently the most extraordinary dimensions. The difficulty of running a level line over ground of this character is enhanced by the general pitch of the ground, valley and upland, towards the lake. For it generally happens in consequence of this, that a level taken over from the bottoms near the head of the valley cannot fail of encountering all the gullies, and as it rises on the face of the slope it must encounter them with greater and greater dimensions, until it finally crosses them at the very maximum of their breadth and depth. This was the case in the line actually run. In the course of ten or twelve miles from the summit, I had already experienced a remarkable increase both in the number and magnitude of the gullies, and by the time I arrived at the Erie county line, I had passed without counting those of smaller dimensions, no less than twenty which might be considered as extraordinary, some, often being from 100 to 200 yards in width and 50 or 60 feet deep. So far as the Conneaut valley was concerned therefore, there remained at this stage of the survey not the smallest doubt of the superior advantage of a line locked down thro' the bottoms. But I still indulged the expectation of securing great advantages in the length and direction of the route to Erie by keeping the high line, and it was not until I had passed the Erie branch of the Big Conneaut that the hopelessness of this route in all respects became fully manifest. I had then before me a district of very broken and irregular country, deeply intersected by the tributaries of Elk creek, on the left a system of parallel ridges, which a little further on, assume a distinct and regular character, and intercepted all approach to the lake except by deep cuttings or expensive constructions in the bed of some of the streams; and finally, the necessity of diverging considerably to the right of the proper direction in order to retain my present level if I would gain any advantage by it in the crossing of Elk and Walnut creeks. These and other similar considerations, determined me without scruple to the choice of the lower line. According to this determination, the line is located from the point C. through the first and second bottoms of the valley, in such a manner as to avoid almost entirely the irregularities of the higher ground. Lockage is introduced, as the declivity requires it, and at such particular points as shall best preserve the directness of the line, and its proper location in other respects. For the purpose of shortening it as much as possible, the upper part of the route is taken on the west side of the creek, and transferred as the latter increases in westing. The crossing place

is perhaps taken rather high in location on the map, but on the ground may be adjusted at any point, as circumstances may determine, above, or in the vicinity of Forster's mill. The quantity of lockage which may be admitted in this part of the route depends partly upon the circumstances and character of the valley, and the nature of the ground on the further route towards Elk creek. Upon this principle it is taken at 170 feet which requires a moderate deep cutting on the further route, but avoids all the gullies of any magnitude in the valley except two, neither of which exceeds 70 yards in width by 20 and 26 feet in depth, respectively. This lockage is distributed in fifteen locks of 11 feet 4 inches average lift. One foot 4 being added for the purpose of passing (in an extreme lockage) 4½ feet per second, more water than is passed by a ten feet lock, which quantity is required in addition to the supply from the springs and brooks of the northern slope, to compensate the evaporation and leakage on the remainder of the route towards Erie. The increased lift is also desirable on some other accounts, the construction will cost somewhat less; and the time of locking through the entire lift will be less by several minutes than would be required for passing seventeen 10 foot locks.

The length of this section from C, to the point D, (in Michael Jackson's meadow) is 16¾ miles. Its location on the map will probably require some corrections, as it was unavoidably laid down from compass notes only; but in the fine bottoms of such a valley, and with 170 feet of lockage there can be no difficulty in making these corrections in such a manner as to ensure the most direct and favorable route in all respects.

Third Section, from the valley of Conneaut to that of Elk Creek.

This part of the route as already intimated, takes advantage of a very convenient range of level ground which skirts along the west boundary of Elk creek township, in the precise direction of the shortest route to Elk creek, and was ascertained indeed by an experiment for that purpose, that a lower graduation than the one above mentioned, which would have excluded us from the use of this ground, would have brought us upon the ground of much less favorable character, and with an increase of no less than four miles in the distance to the creek. The only disadvantage accompanying it, but which would prove nearly the same in any location, is the crossing of Jackson's run and the east branch of the Big Conneaut. The former according to our graduation is a gully of 23 feet by 100 yards, and the latter 26½ by 176 yards, with a depression of about ten feet more in the bed of the creek. Both, however, are sufficiently well provided with earth for the purpose of embankment. From the east branch, eastward, the ground is of the most favorable character; and the line passing by a slight deep cutting into the head of the valley of Crooked creek locks thrown 31¼ feet, in three lifts, to a dividing level between that and the valley of Hall's run. Length from Michael Jackson's to the head of the grand lockage in the valley of Hall's run 6 miles and 9 perches.

Fourth Section, crossing the valley of Elk creek and the deep cut.

This valley has the character of an immense irregular gully, varying in the vicinity of our line, from 4 to 700 yards in width and cutting down through all the benches* of the lake slope, to an extreme depth of more than 200 feet below the level at which we approached it. To take in the whole of it, by any mode of crossing whatever, is of course out of the question; the only feasible method is to lock down to into it to such a level as will reduce the crossing to reasonable limits, and then to wind down the east side of the valley until the descent of the country enables us to take the surface and resume our direction towards Erie. We thus gain also, the advantage of passing two parallel ridges of the lake slope, in connexion with the passage of the creek. The examination of the valley was conducted in conformity with this plan. Those places had been suggested as promising some advantages for crossing. First, at Anderson's mill dam, about a half a mile above our routes. The second, at Anderson's crossing place, near the Rich hill; (so called) also a little above our route; and the third, near the mouth of Hall's run, a little below the route. In examining these, a fourth point also attracted some attention, and was examined in comparison with the others, viz. about 400 yards below the Rich hill, and in a very favorable situation with respect to our route.

The points upon which these crossings were compared, were 1st, their relation to the routes; 2d, the height and depth of embankment necessary, and the supply of earth necessary for constructing it. 3d. The length and height of the acqueduct. And 4th, the facility in each case, of leading the canal by the east bank of the valley. The chief merit of the crossing at Anderson's mill, consists in the height and relation of the immediate bank, being such as to require little or no embankment, and an acqueduct of moderate length. On the other hand, however, its position with respect to the route, is rather an objection; and the difficulty of leading the canal *from* it by the east side of the valley, a very formidable one. In general, the immediate banks of the creek, on both sides, are precipitous, the stream having worn down its bed through the soil of the intervale, and to a considerable depth in the soft friable slate which constitutes the substratum. In some places, it has encroached upon the main branch of the valley in such a manner as to form a raw, crumbling precipice of 70 or 80 feet in height, with a steep rising aclivity, frequently 40 or 50 feet higher. One of these precipices, 280 yards long, occurs on the east side of the creek, nearly opposite the Rich Hill, and presents a serious difficulty in the way of any prospect which would require the construction of the canal along its face. No construction of the kind could be considered as safe then, unless supported, at least in part, by a wall of masonry, brought up from the bed of the creek; and this, which under any circumstances, would be a work of extraordinary expense, becomes a paramount objection in the present instance, in consequence of the scarcity of stone.

This objection applies equally to the crossing at Anderson's mill and that at Anderson's crossing place, both of which require a passage for the canal down the valley, by the way of this bluff. Considering these, therefore, as excluded, it only remains to institute a comparison between the other two, viz. One, 400 yards below the Rich Hill, and the other at the old mill, near the mouth of Hall's run. Both of these are in a convenient relation to the route, the first being approached by the eastern, and the other by the western side of the valley of Hall's run.

The Rich Hill is an insulated knob, situated between Hall's run and Elk creek, about half a mile above the forks. It appears to be the remnant of a tongue of upland, which at some former period, may have supported the valley of these two streams, and of which, another trace is left, in the form of a low, second bank, which extends down nearly to the hill. By taking advantage of this second bank in connection with the western slope of the hill, a canal may be brought at a convenient elevation, to within about 360 yards of the crossing place, with a very little extra labour. The remaining distance is an intervale bottom, with an average elevation of 34 feet above the bed of the creek. This would, of course, require embankment for any additional elevation; but the immediate vicinity of the hill, affords an abundant supply of earth for this purpose. The trough of the stream at the point of crossing, is 380 feet wide; but of this, 180 feet consists of low bottom, from 6 to 12

* This word is used to express peculiar features in the slopes generally of the country under examination. Those slopes occurring in successive graduations, something in the form of ridges, rather than declivities. The level surface of each step is called a *bench*.

feet high, which may, with great convenience, be embanked to any additional height by the earth from a high, and rather steep bank, which overlooks it. In this way the aqueduct may be reduced to as little as 150 feet; which, in a vicinity badly provided with stone, is a point of some consideration. Finally, the line from this crossing place, down the east side of the valley, is attended with litttle or no inconvenience whatever. Such is the crossing by the Rich Hill, that near the old mill is approached as already mentioned, by the western side of the valley of Hall's run. The upland, however, recedes gradually from the line on that side, in such a manner as to render some embankment necessary, for nearly half a mile, before reaching the crossing place. At 550 yards from the latter, the upland fails entirely, and on this distance an embankment would have to be constructed, at an average of at least 8 feet higher than that at the Rich Hill, besides a heavy culvert and extra embankment, at the crossing of Hall's run. The expense of these constructions, would be increased by the difficulty of procuring earth in convenient situations for the purpose, and for the same reason it would be unadvisable to embank any portion of the low bottom of the creek; an aqueduct would, therefore, be necessary, to the full extent of 400 feet, which is the breadth of the creek at this point. The landing place on the east shore, is only 23 feet high, for the first 80 or 90 yards, which would require, therefore, a heavy embankment. The ground then becomes more elevated; but its height is still insufficient, and would require considerable embanking for 240 yards further. Under all these circumstances, the crossing place at Rich Hill, is considered decidedly preferable, having, at least, ¼ less embankment, a much more convenient supply of earth, and nearly two-thirds less aqueduct.

The graduation of the level for the embankment and aqueduct, is determined, as in other cases, with some reference to the ground in advance. In examining its character for this purpose, it appears that a line, at any reasonable elevation, cannot so conveniently be carried out to the surface of the ground, as by a deep cutting north of the village of Fairview. The extreme elevation on the line of this cutting, is 108½ feet above the creek, at the crossing place, and from a careful comparison of its length and volume, under various suppositions with those of the embankment, having in view also, the character of the ground on the route eastward, the crossing is established at 71½ feet above the water of the creek: or which is the same thing, 160½ feet above Lake Erie. This leaves 37 feet for the greatest depth to the top water line, on the deep cutting of Fairview. The elevation of our line, in approaching the valley at Hall's run, taking into consideration the declivity of the surface, from the summit to this point, is 306 feet above Lake Erie; and the above graduation gives, therefore, 145¾ feet, as the total descent to be effected by the lockage on the west side of the valley. This descent it is proposed to distribute in 14 equal lifts, down the side and bottom of the valley of Hall's run, by an arrangement which was suggested, and appears singularly favoured, by the circumstance of the ground. The first lockage leads by a slight, deep cutting, into the head of a large, deep gully, which descends exactly in the direction of the route. This may be divided by dams and locks, into six successive basins; from the last of which, a short oblique cut to the left, leads into another gully, capable of affording two more basins of the same kind. Two others may be added, by the construction of a single lateral dam, under favourable circumstances; and we have a complete chain of ten locks following each other in rapid succession, with a descent which brings the line nearly to the bottom of the valley at this point. The peculiarities of this arrangement are, that, with the exception of the short cut and lateral dam just mentioned, only four of the locks, and a very small portion of the canal, requires any excavation worth notice. Only three of the former, will even require breast walls, as the declivity affords, generally, an easy, natural descent, from chamber to chamber. The only possible ground of objection, is the rapid succession of the locks. The clear distance from wing to wing, being only 184 feet; but they are still made independent of each other, by the enlarged width and depth of the basins, the former of which can, with perfect convenience, be made as great as 30 yards at the top water line, and the latter, from 6 to 15 feet. We are thus fortunately enabled to connect into a valuable auxiliary, the very circumstance from which the greatest embarrassments were expected, in the construction of this lockage. Should a more gentle descent, however, be desired, it may probably be found by exploring to the right of the present location, and then connecting the line accordingly, as far back as the east branch road.

On the east side of the creek, the construction of the line presents nothing particular or difficult, south of the ridge road. At that point a very short tunnel, or deep cut and bridge, is necessary for passing under the road, and avoiding a sharp turn round the point. Three hundred yards further north, the deep cutting commences, and continues 283 perches, to the end of this section, where it runs out in the bottom and Hagerty's run. Totol length of the section, from the head of the grand lockage to the end of the deep cut, at F, 3 miles and 239 perches.

5th SECTION.—*From Hagerty's to Walnut Creek.*

This passes in its whole length, upon a level bench of ground, at the foot of the north slope of the ridge upon which the ridge road passes, from which a number of copious springs issue, and afford a considerable addition to the supply of water. No locks accrue; and the only construction of any account, is a culvert, and moderate embankment at Trout run, and a short feeder for the introduction of that stream. Total distance, 5 miles 294 perches.

6th SECTION.—*The crossing of Walnut Creek.*

I have already made some remarks upon the character of this crossing, as a work of labour and expense, rather than of any great professional difficulties. It is a simple gulph of about 180 yards extreme width, and nearly 100 feet deep, but with bold, regular banks, rising on the west side fully, and on the east nearly to the level of the adjacent country. The point selected for crossing, is precisely that at which our level line struck the bank, and a little south of the land line which forms the south boundary of the lake range of lots. Its extreme width at the top of the banks, is 171 yards, and at the bottom 60 yards, and its depth 97½ feet below the graduation line of the canal. On 120 yards of this width, it is proposed to construct an aqueduct of five openings, and to complete the remaining 51 yards with embankments, for which there is plenty of earth, in very convenient situations, on both sides. A moderate embankment of 180 yards, is then only necessary for completing out the work to the upland bank, on the east side. Total length of the whole from G. to H. 67 perches. Another locality for crossing, about 560 yards further up, was examined and measured in comparison with the one just described. To make use of it, however, would require, in ascending and returning, not less than 1100 yards additional length of canal; and it does not appear, from the measurement, to possess any superiority as a crossing place, that would compensate for the inconvenience and expense of this addition.

Seventh Section, from the crossing of Walnut creek to Turkey Ridge near Erie.

This passes over ground of the same character and equally convenient for the location and construction of the canal, as that west of Walnut creek; two or three slight ridges occur, crossing the route in the course of the first five miles, which render it necessary to retain thus far, the full height of the Elk creek graduation.

The last of these is passed in the vicinity of M'Creery's farm soon after entering the state *reserve*, and then it is recommended as favouring the directness of the route, to commence locking down. Four locks of 10 feet lift are located from this point to the ridge. The first, a little eastward of M'Creery's road; second, between Eldridge's and Green's improvements; the third, at the east branch of the Cascade run, and the fourth at the edge of the Turkey Swamp. The last renders necessary a short deep cutting at Turkey ridge, but it is nevertheless preferable, as diminishing by one lift the lockage from this point to the lake. Short feeders on this section enable us to appropriate the waters of three branches of Cascada run, and of Ichabod's run.

Length from the point H, at Walnut creek, to the end of the cut at Turkey ridge, 7 miles 262 perches.

Section Eight, from Turkey Ridge to the termination in the Bay.

It now only remains to explain the mode of descending into the basin of Presque Isle. For this purpose three routes have been mentioned; the first by Mill creek, on the east side of the town; the second by a gully passing through the public square; and the third by the gully of Lee's run, on the west side of the town. As the first of these would be considerably greater in length than either of the other two, and as it promised no particular advantage, either on the score of construction or local accommodation, being also attended with the inconvenience of shallow water at the mouth of the creek, I did not think it necessary to bring it strictly into comparison with the other two. Of these, the first named had the appearance of descending rather rapidly, for convenient lockage, from the public square to the water, and upon trial this was found to be the fact. It is also objectionable as affording too little space in width, for the construction of the necessary locks and basins. The last named, viz. The gully of Lee's run was explored with much greater confidence of a satisfactory result. It affords generally, a shorter and more direct route to the basin than either of the others; its declivity though great, is within practicable limits; its breadth is generally sufficient for the construction of the works, and finally, the point of its communication with the basin at the navy wharf, perhaps more favourable than any other, to the local as well as the general interests of the canal in all respects.

The lockage remaining to be distributed from Turkey ridge to the lake, is exactly 120 feet, allowing for the descent of the top water line from Elk creek to this place. This is distributed down the bottom of Lee's gully in 12 ten feet locks. The space is not insufficient, and the distribution could be made with perfect regularity to the end, were it not that the declivity is intercepted before it reaches that point, by a substratum of (soft friable) slate, ending in a precipice of twenty-one feet at the edge of the water. To meet this difficulty four different modes have been considered. First, to continue the declivity of the canal, by sinking the three last basins into the rock; allowing to the last a slight projection into the lake. Secondly, to embank the whole of the last line with moderate excavation on the second basin, fairly above the surface of the third lock. Thirdly, to construct a lock of twenty feet lift, by means of a lateral reservoir; and fourthly, to construct two contiguous locks exterior to the ledge.

It is unnecessary here to detail all the reasoning which has been employed in the comparison of these various modes. The points on which they have been compared, are first the expense; secondly the practical convenience; thirdly, their conformity with regard to expense of water and locking with the other locks of the canal. The result is a decided preference for the method of the two *contiguous locks*, and it appears, indeed, that contiguous locks when limited, as in this case, to the number *two*, are in some respects superior to every other mode of lockage. Their attendance requires, that the upper chamber should be kept habitually full, and the lower one empty. When this is done boats may lock through the whole twenty feet in either direction, in an average of ten minutes; whereas, other things being the same, a boat cannot lock through twenty feet, by two insolated locks, in less, one time with another, than fifteen minutes and a fraction. The extreme quantity of water for a full navigation is the same, being six locks full per hour, drawn from the superior level in both cases. The only point of inferiority is in the total working capacity. The six locksful per hour in two insolated locks, working together, will pass (in effect) *eight boats through twenty feet*, whilst the same quantity in the contiguous locks is only sufficient for passing *six boats* in the same time. This would be an objection to their use on the route of a canal intended for a very full navigation, but under ordinary circumstances, and especially at a point where a canal unites with a different navigation, it is presumed a working power of six boats per hour, will be found quite sufficient. It should be remarked farther, that in point of *expense*, the contiguous locks have, generally, a considerable advantage. The mode of placing them in the present instance, will be such as to bring the upper lock first in contact with the ledge, giving to the lower one an extreme projection of 200 feet; the upper basin will then be formed by a slight excavation in the top layers of the slate. By giving to this basin a breadth of fifty feet, and a slight additional depth, we may make its length as little as 290 feet from wing to wing, and this will enable us to adjust the level of all the following basins in the most convenient relation to the surface of the ground.

The final completion of the canal at this point will require some enclosure on the side of the bay, for the safe harbourage of the canal craft. For this purpose I propose the following plan, viz. To construct at the distance of 150 feet in advance of the last lock, a mole or pier 300 feet long, extending upward and downward in such proportions as may be determined by the depth of water. It may be strictly parallel to the shore, or converging towards it in a curve, at the extremity, and should be united with the towing path of the canal, on the line of the present wharf by a pier and bridge sufficiently high for boats to pass under it. The construction of a quay on the land side, with other connecting piers and bridge is also a part of the plan, but these are more properly the objects of private enterprise.

The length of the section just described, from Turkey ridge to the mole, is one hundred and ninety-six perches: And we are now prepared to sum up the total distance and lockage from the commencement near Cumming's bridge to the same point, viz. The distance 47 miles and 140 perches; about a mile shorter than the road; and the lockage 507½ feet in 48 locks; allowing ten inches for the declivity in the top water line produced by the feeding current, from the summit towards Erie. The drawings for illustrating the preceding descriptions, are first. A general map and profile of the whole route on the scale of one inch to the square mile. Secondly, A series of maps exhibiting the details of the whole, on the scale of five inches to the mile.

The location of the route is carefully laid down upon the latter by the same scale, and upon the principle, as far as other conditions would admit, of reducing the labour of excavation to the smallest possible amount. Should this route be adopted, and the views of the engineer approved, the actual location, except in the Conneaut valley, may be accomplished, (supposing the levels accurate) by the mere tranfer of the measures from the paper to the ground. Before entering upon the general estimate, it will be proper to give some explanations relative to the construction of the works in masonry.

The scarcity of materials has already been alluded to. No stone of a sufficient good quality for the works having been seen on the whole route west of Walnut creek. Still, however, there is reason to believe that

stone *may be* procured at every point where its use is required, at an expense not greatly exceeding its ordinary cost. At Erie there will be no difficulty, as stone of an unexceptionable quality is found at several places in that vicinity. At Walnut creek also, a stone which it is believed, will answer very well for the plans of the aqueduct at that place, is found in layers of 10 or 11 inches in the shallow water of the lake. From either of these localities stone may be furnished by a land carriage of *four miles*, for the works on Elk creek. For those in the Conneaut valley it is thought that stone of a suitable quality may be found on Fetterman's run, and probably near Jenk's mill, or in Jackson's gully; at all events, it is highly probable that the material may be obtained from one or other of these localities for all purposes, except that of the face work and coping. Under these circumstances the cost of masonry will vary at different points of the route, very nearly at the following rates.

At Erie and Walnut creek, good ordinary masonry suitable for foundations laid in cement, per perch of 25 feet, at $2 50. Best jointed work laid in like manner (face dressing not included) per perch of like measure $2 85

At Elk creek the ordinary kind will cost	2 80
The best	3 15
In Conneaut valley the ordinary will average	3 00
The best	3 40

Bricks may in many cases be substituted with advantage; if burnt for the purpose, but the ordinary bricks of the country are wholly unfit for any purposes of construction whatever.

The culverts and other small constructions not being greatly affected by these variations, are calculated at the average. According to this mode, small culverts of *three, five* and *seven* feet in an embankment of ordinary depth, are estimated for the whole line, at $285, 375, and 480 respectively.

Those of 9 feet will cost about	$610
Stop gates are estimated in a similar manner	672
Waste gates of masonry (for every opening of eight feet) at	271
Weirs of masonry for a lip of 20 feet	465

Other works however, as the locks and aqueducts, require a more particular estimation.

Locks. These are supposed to be constructed of the most substantial masonry throughout. All the face work, and coping, *rough cut*, and the bottoms finished with rubble and a *good flay pavement* or *reversed* arch of *brick*. The *breast walls* should be set above the recesses of the head gates, and the latter constructed in all respects by the same model as those of the tail.

A lock of this construction of 10 feet lift, and at the Erie prices of masonry, will cost $6,530, viz.

1220 perches best masonry, at	$2 85	3,447	
322 ordinary do.	2 50	805	
5940 square feet face cutting	25	891	
			5,143
90 perches rubble, at $1 50 and 1,680 square feet brick work at 25		555	
750 yards excavation (extra) and 180 yards puddle		142	1,387
Grillage and sheet piling		125	
Gates and all fixtures		565	
			$6,530

A similar lock with a lift of 10.41 feet (and supposing half breast walls) according to the prices of masonry at Elk creek, will cost $7,019 50, viz.

1210 perches best masonry at	$3 15	3,811 50	
339 ordinary do.	2 80	924	
5980 square feet face cutting	15	897	
			5,632 50
Other items the same as on the preceding page			1,387 00
			$7,019 50
The same mode of estimation for a lock of 11⅓ feet lift and according to the estimated prices of masonry in the Conneaut valley, would give for the total cost			$7,812 00

Aqueducts. A variety of modes have been discussed, for the great aqueducts of Elk and Walnut creeks—differing chiefly in the materials and construction of the trunk. One mode of construction would consist of a simple wooden trunk, laid without any artifice upon piers of masonry; but this, as it requires a great number of piers, would be altogether unadvisable, in a case where the piers themselves constitute so considerable a portion of expense. Another mode admits a large space between the piers, and gives intermediate support to the trunk by means of wooden frames. A 3d, in the same case affords the intermediate support by frames of *iron*. A 4th, employs a trunk also of iron, and a fifth consists of arches and a complete structure of masonry.

The system of construction by means of wooden frames, cannot be recommended in any work of this kind of more than ordinary magnitude and expense, and in the situations at Elk and Walnut creeks, where in consequence of the great height, the saving in first cost would be but a very inconsiderable part of the whole, and where for the same reason, any great liability to repairs would be a peculiar evil, they are considered as decidedly objectionable. The same objection, does not apply to the same extent to a wooden trunk, where the supporting system is composed entirely of imperishable materials, though undoubtedly, the most perfect structure would be that which is built entirely of iron or stone. To the latter material there is one system in the present case on account of the extraordinary expense attending the construction of scaffolding, centres, and other accessary works for turning an arch at so great a height. An iron frame on the contrary, requires no such preparation, it may be set up in the most expeditious manner, without any centering or extra scaffolding whatever, and becomes immediately the means of completing the remaining parts of the structure. It may be added, that the practical advantages of this mode of construction, are now no longer matter of mere conjecture. One of the finest aqueducts in the world, and in a situation strongly resembling those under consideration, is constructed of iron; and fully confirms after nearly twenty years use, the opinions and calculations of its engineer. Under all these circumstances, my own preference inclines to a structure in which the supporting frames are of cast iron, and the trunk either wood or iron as may be preferred. The system proposed for the frame, is a little different from that of Mr. Telford, especially if the wooden is used. In that case, the object should be to give two lines of intermediate support to the sleepers of the trunk, and avoid as far as possible, all other strains. For this purpose each rib is made to consist of two *rafters* and a crown *beam*, having altogether, a clear span of sixty-four feet and ten feet rise.—The crown beam is *entire*, spread asunder, on the impost to the distance of 5½ feet. The opposite rafters (of the *same pier* but in different arches) are connected across the top of the pier, from head to head, by chains or bars of wrought iron, which will also assist in setting the frames, and the middle of the rafters is supported in a similar manner by a wrought iron tie. Five ribs connected by strainers of cast iron at five points, complete the frame, which is twenty-two feet wide. The strainers placed at the junction of the rafters and crown beam, rise somewhat above the rest of the frame with a strong flanch upon which the sleepers of the trunk are bolted down in such a manner as to touch the frame in no other point. The trunk is twenty feet wide in the clear at bottom, and 12 at top, the horse path 4½ feet wide, projecting over the water. The cost of one pier and

arch, for an aqueduct of this description 70 feet high, may be estimated as follows, viz:

Pier (12 feet by 38) on the base, and 8 by 20 under the plinth of the impost, 814 perches best masonry at $4, including machinery	$3,376
Frame 23 tons cast iron, delivered and set up, at 150 dollars per ton	3,450
One and a half tons wrought iron chains Tiester, at 150 dollars	225
Wooden trunk 2100 superficial feet, caulked, sheathed, lined, &c. at $30	630
Horse path, rail, &c.	100
Total.....	$7,781

For a height of 98 feet, the estimate will stand thus:

Pier, viz: 1103 perches masonry at 4 dollars	4,412
Frame, trunk, &c. as before,	4,405
	$8,817
An iron trunk (the work remaining in all other respects the same) is estimated for each arch at an additional expense of	2,260
And an arch of stone, at least	3,062

Estimate. Section 1st. From A. near Cumming's bridge to the end of the deep cutting, in the valley of Conneaut, at C.—5 miles 213 perches, viz: 3 miles along the lake shore and through the low grounds of the Beaver Dam run, and the remainder extra cutting through the dividing ridge; extreme depth to top water 18 feet.

Excavation 361,876 yards, at ordinary depths, easy digging, averaged 7 cents	$25,331 32	
239,740 deepest cutting and embankment, 10	23,974 00	
		$49,305 32
Puddling on 304 perches at $3 50 per perch		1,414 00
Culverts, viz: 1 of 14 feet at the outlet, $1,240 and one of 9, equal 610	1,850 00	
3 of 5 feet, at $3 75 as formerly estimated	1,125 00	
		2,975 00
Bridges, viz: 1 at 140 and 2 at 250		640 00
Grubbing on 4½ miles at $240 and fence,		2,440 00
		$56,774 32

Section 2d. From the end of the deep cut to Michael Jackson's near the forks of the big Conneaut 16¾ miles, through the intervale generally slight profile and easy digging; lockage 170 feet.

Excavation, viz: 571,768 yds. ordinary levels, average at 7 c.		40,023 76
Do. 136,196 do. do. 8 c.		10,895 68
Do. 160,405 short embankments, 10		16,040 50
		$66,959 94
Puddle on 788 perches at $3 50 per perch		2,758 00
Culverts, viz: 1 of 14 feet at the two crossings of the Conneaut	1,240	
Do. 2 of 9, $610 and 4 of 7 at $480	3,140	
Do. 15 of 5, 375 16 of 3 285	8,475	
		12,855 00
Waste gate of 2 eight feet openings, at $271 50 cts. as formerly estimated		543 00
Bridges, viz: 4 at 250 dollars and 15 at 140		3,100 00
Locks viz: 15 of 11⅓ feet average fall at 7,812 dollars		117,180 00
Grubbing 11½ miles and fencing 16¾		5,360 00
		$208,755 94
NOTE.—The Lockage by means of 17 ten feet locks would have cost at the Conneaut prices		125,664 00

Section 3. From Michael Jackson's to the head of the lockage at Hall's run, 6 miles and 9 perches.—Crosses Jackson's gully and east branch of big Conneaut and has a slight extra cutting near No. 8 brook; otherwise favourable ground and easy digging. Lockage 31 feet 9 inches.

Excavation, viz: 231,260 yds. at ordinary depths, aver. at 7 cts.	16,188 20		
123,969 embankments, 12 cents	14,866 28		
			31,054 48
Puddle on 370 perches at $3 50 p. perch			1,295 00
Culverts, viz: 1 at 30 ft. at east branch of Conneaut 814 perches, at $3 75	3,052 50		
320 perch. at 1 75 cents	880 00		
Centering, &c.	980 00		
		4,912 50	
One of 9 ft. = 610, 2 of 5 at 3 75 c. and 3 of 3, at 2 85 cts.	2,115 00		
			7,027 50
Bridges, viz: 4 at 2 50 cts. and 7 at 1 40			1,989 00
Locks, viz: 3 of 10 ft. 7 in. lift at 7,019 50			21,058 50
Grubbing on 3½ miles and fence 6 miles			2,630 00
			Dolls. 65,045 48

Section 4. This includes the lockage at Hall's run 145.9, the crossing of Elk creek and the deep cut at Fairview. Total 3 miles 239 perches.

Excavation, viz: 180,610 yards at ordinary depths, averaged at 7 cents	12,642 70		
256,000 embankments at the crossing of Elk creek, at 12 c.	30,720 00		
482,016 deep cutting viz: 270 perches, extreme depth 37 ft. to top water at 14 cents	67,682 24		
			110,849 94
Timber work in the dams, at the lockage, 14,400 ft. at 5 cents			720 00
Puddling, viz: 2,800 cubic yards at the lockage, at 30 cts. and 536 perches in line, at 3 50 cts.			2,825 00
Locks, viz: 14 of 10.41 ft. lift, at $7019 50			98,273 00
Aqueduct of 3 spans, at $7,781 each	23,343 00		
Extra abutment	3,376 00		
Wings 2,468 perches, at $2 50	6,910 40		
			33,629 40
Culverts, viz: one of 14 ft. at Hall's run and one of 5 feet at Deadman's gully			1,615 00
Safety gates and waste gate with two 8 feet openings, as formerly estimated			1,888 00
Bridges, viz: 3 at 140 and 3 at deep cut, average at 400 dollars			1,620 00
Grubbing and fencing			665 00
			Dolls. 252,085 34

Section 5. From Hagerty's to Walnut creek, 5 miles 294 perches, slight embankment at Trout run; the remainder very favourable, except the soil requires extensive puddling. Very easy digging.

Excavation, viz: 195,810 yds. at ordinary levels, aver. at 7 cts.	13,706 70		
38,200 embankment, At Trout run 13 cents	4966 00		
			18,672 70
Puddle, viz: 1,626 perches, at $3 50			5,691 00
Culverts, viz: 1 at 12 ft. at 925, 2 of 5 ft. at 375 and 2 at 3,285			2,245 00
Bridges, viz: 8 at 140 and 4 at 200 dolls.			1920 00
Grubbing, on 4 miles, at 340 dolls. and fencing 5.⅞ at 240			2,770 00
			Dolls. 31,298 70

Section 6. Crossing Walnut creek to the upland on east side 67 perches.

Excavation 36,600 yds for embankment at 12		4,392 00
Aqueduct of 5 spans, at $8,817	44,085 00	
Extra abutment	4,412 00	
Wings 3,912 perches	9,780 00	
		58,277 00
Puddle on 44 perches, at $3 50		154 00
Safety gate and waste gate as at Elk creek		1,888 00
	Dolls.	64,781 00

Section 7. From Walnut creek to Turkey Hill, near Erie, 7 miles and 262 perches. Very favourable ground except a porous soil as in the former instance, and slight extra cutting at Turkey Hill. Lockage 40 feet.

Excavation, viz: 229,350 yards slight profile, including three small feeders 7 cents	18,054 50	
117,110 embankment and interior digging, at 9 cents	10,539 90	
		26,594 40
Puddle on 1,920 perches, at $3 50		6,720 00
Culverts, viz: 3 of 7 feet at $480 and 3 at 3 feet, at 285		2,295 00
Wier of 20 feet lip as formerly estimated		465 00
Locks, viz: 4 of 10 lift, at $6,530		26,120 00
Bridges, 9 at $140 and 3 at 250		2,010 00
Grubbing three and one-fourth miles, at $340 and fence seven and three-fourth miles, at 260 dollars		2,965 00
	Dolls.	67,169 40

Section 8. From Turkey Hill to Erie harbour, one mile and 9 perches, with a lockage of 120 feet.

Excavation, viz: 34,415 yards and ordinary depths, at 7 cts.	2,409 05	
3,692 in loose slate at 35 c.	1,292 20	
		3,701 25
Puddle, 360 yards at 30 cents per yard		108 00
Locks, viz: 12 of 10 feet lift at 6,580	78,360	
Extra walls at the ledge, 280 perches at 2 dollars	560	
		78,920 00
Bridges, viz: 5 at 300 dollars		1,500 00
Grubbing and fence		265 00
Pier, 140 yards long 9,300 feet squared timber at 6 cents	558 00	
6,720 of plank, at 6 cts.	403 20	
4,200 of round timber, 2½ cts.	105 00	
1,400 of stone, at $2 75	3,850 00	
		4,916 20
		89,410 45
	Dolls.	

SUMMARY.

Section 1. - - - -	56,774 32
2. - - -	208,755 94
3. - - - -	65,045 48
4. - - -	252,085 34
5. - - - -	31,298 70
6. - - - -	64,781 00
7. - - - -	67,169 40
8. - - - -	89,410 45
Grand total - -	$835,320 63 Or 17,620 per mile.

Of this aggregate the crossings of Elk and Walnut creeks, including the embankments and deep cuts, make up 196,084 64-100, which being deducted gives at the rate of 13,481 dollars per mile for the cost of the remaining works. The total expense for lockage at $672 30-100 per foot lift is $341,551; deducting this also, leaves $297,685; or $6,280 per mile for the cost of all the other works.

All which is respectfully submitted.

D. B. DOUGLASS,
Professor of Engr. U. S. Mil. Academy:

The following notes and calculations are submitted to the Board, relative to the supply af water for the Waterford summit, and the various questions connected therewith.

As the season was rather unfavorable for the operation of guaging, in consequence of the frequent rains having raised the streams somewhat above their ordinary summer discharge, I adopted the following plan, by concert with Mr. Ferguson, for obtaining the supply under the influence of the drought of 1826. It will be recollected, that in the course of the survey of that year, the waters of French creek were guaged with some care at Meadville, and as it was reasonable to suppose that the ratio of discharge for different seasons was nearly the same at that place and at Waterford, it was now proposed to repeat the measurement there, for the determination of that ratio, at the same time that my measurement was performed at the (2d) forks.

The point selected for the measurement near the forks, was one at which the breadth, depth and velocity of the stream within the line of the operation continued as nearly uniform as possible, the latter being nearly as could be obtained, the result of mere declivity. Two parallel sections (60 yards apart) and the superficial velocity, were measured in the usual way, the latter by means of thin wooden floats so adjusted as to be immersed in the surface of the fluid. The mean velocity was then deduced in the most careful manner from that of the surface, and the product of this and the mean transverse section evidently gives the quantity of the discharge. The measured velocity was 1,162 feet per second, the calculated mean=0,845 feet per second; and the mean transverse section 105,9 square feet; whence the total discharge is obtained at 89½ cubic feet per second, very nearly. On the preceding day, the water of Le Boeuff creek had also been guaged and found to afford a supply of 5-6 feet per second, which being also available for the purpose of the summit level, was added to the preceding in estimating the entire supply, the result corresponding to the measurement is 95.1 feet per second. The measurement of Mr. Ferguson was performed at Rodger's ferry in nearly the same manner, except that as the superficial floats were found to be effected by a breeze down stream, another mode was employed for the velocity of submerged floats, which is believed in this case to furnish the more accurate result. The quantity calculated from it is 257. 55 feet per second. It was remarked by Mr. Ferguson, that the creek was falling at the time of the measurement; and in connection with this remark, it should be understood that my measurement was accidentally deferred till the following morning. The least that could be allowed for the fall in the mean time would be 3-100 part of a foot, which would give 255.4 feet per second for the discharge at Meadville, corresponding (in time) with the gauging at Waterford.

Comparing this with the result of the preceding year (158,9 feet,) and reducing the Waterford supply in the same ratio, we obtain 59½ cubic feet per second as the supply of the summit in question under the influence of the drought of 1826, and it is not probable that it will often be found lower than this limit.

This it must be allowed is a very moderate supply for the wants of a summit level, but it is not very difficult to adopt a system of lockage to it in the present case in such a manner as to afford in many respects the advantages of a large supply. The mode of proceeding would be as follows:

Assuming the length of the summit level, including the feeder, at twelve miles, if we deduct from the whole supply, the quantity due to evaporation, leakage and waste on this distance, say 13 feet per second, we shall

have 46½ feet per second, as the quantity available for the lockage, the half of which—23¼ feet per second, may be drawn off for this purpose at each extremity of the summit level. This we find is sufficient for the supply of a 10 foot lock, in constant use, and a mile of evaporation and soakage besides, whence we infer that locks of this lift may be used at the extremities of the summit level and for a mile down the slope on either side, without any danger of experiencing a deficiency of water. In proceeding further down the slopes however, the surplus of evaporation and soakage will no longer suffice for such a lockage, and then it becomes necessary to determine such a diminution of the lift as shall always bring the demand of the locks within the limits of the supply. On the calculation for this purpose, I assume the entire length of the canal which is to be fed from the summit at 34 miles, viz. from Erie to the nearest point on French creek at which another feeder could be taken in. The expenditure of water on this distance for all purposes except lockage would be 31½ feet per second leaving in round terms 28 feet per second still available at the extremes, or 14 feet per second at each. The locks which would be exactly graduated to this supply, would have a lift of 6½ feet, but as it is not probable that the locks will often be pressed to their utmost working power, or that the water will be reduced to as low a limit as the one used in these calculations, it will be sufficient to make the extreme locks of 7 feet lift at least, which is better adapted to the ordinary state of the case.

Briefly stated then, the mode will be as follows, viz. to make the locks at each end of the summit level, and for a mile down the slope on each side, of 10 feet lift, and afterwards to diminish the lift in a constant ratio per mile, so as to reduce those at the two extremes (of the 34 miles) to 7 feet each, and this will place the whole system in the most advantageous relation to the supply of water.

The exact height of the Beaver dam summit level I do not know, but it is estimated to range somewhere between 620 and 630 feet (above Lake Erie) after a reasonable depth of cutting. If we assume it at 628 to the top water line, and suppose that five 10 foot locks may be graduated on the first mile of the descent towards Erie, the remainder by the system of diminished lifts will require 68 locks with an average lift of 8½ feet. On the Meadville side, the number will probably not exceed two of the 10 feet lift, and about four with diminished lifts to the second feeder, (at the end of the 34 miles) after which about five more will bring the line to Benner's mill.

The practical utility of this system will not greatly differ from that of a system of 10 feet locks except that it will require on the part of each boat about 1-6 or 1-7 more time in performing the total lockage of the line; as to the cost, it will be about ten dollars per foot greater. As to the practicability however, so far as the supply of water is concerned, I have no hesitation in giving my opinion in its favor.

An apprehension having sometimes been expressed as to the declivity on the Erie side being too great for the lockage, it may be proper to add, that no difficulty will be experienced on this account. It may be in the power of the engineer, indeed, in an extreme case, to construct as many as 17 or 18 locks on a mile, and yet preserve their perfect independence, and this it is presumed is a much more rapid lockage than can be required on any part of the line alluded to.

One further remark may also be made in connection with this subject as regards the Conneaut route, viz: that from the smallness of the supply of water, to be obtained from French creek, and the necessary length of the feeder, (which is frequently found more expensive of water than the canal itself,) it is not probable that a sufficiency could be commanded on the summit for the supply of a canal by that route.

All which is respectfully submitted,

D. B. DOUGLASS, *Prof. of Eng.*

Biographical Notice of SAMUEL EMLEN, M. D.

By Charles D. Meigs, M. D.

From the North American Medical and Surgical Journal, for July, 1828.

DIED, on the 17th of April, 1828, in the 39th year of his age, Samuel Emlen, Jr. M. D. Secretary of the College of Physicians of Philadelphia, and one of the Physicians to the Pennsylvania Hospital.

This is the third time since the establishment of our Journal, that we have been called upon to record the decease of worthy and valuable members of our profession in this city. Ewing was taken from the midst of us just at the moment when his talents and virtues had begun to render his name familiar to the public ear as a rising and successful physician; the venerable Doctor Griffitts, at the close of a long life of successful devotion to the humane duties of medicine had crowned him with reverence and popular respect; and now again, the irreproachable Emlen, having slowly surmounted the first difficulties in the way of professional reputation, is, by an inscrutable decree of Divine Providence, snatched from his family, his friends, and the art, which he seemed born to honour and advance by his industry, abilities, and exemplary life and conversation.

We have been commanded by the Kappa Lambda Society, of which he was a valued member and officer, to prepare a sketch of his life for this number of its Journal; and in obeying this command, we hope that our feelings of personal attachment to him may not lead us to make any false estimate of his many virtues, or to overrate his acknowledged abilities. We sincerely deslre at least to say nothing more than the simple truth in regard to our deceased member.

Such is the nature of our calling, that few physicians, whose lives have been short of half a century, have been able to furnish considerable materials for the pen of the biographer. Baglivi, Saunders, Bichat, and some others, furnish rare exceptions to the rule; and even their lives are rather to be read in the works they have left as bequests to posterity, than in the events they witnessed, or the transactions in which they were personally engaged. The peaceful, quiet and unobtrusive tenor of even a good physician's life, affords, for the most part, but little scope for details, or description; since good sense, faithful discharge of duty, charitableness, inflexible integrity, christian piety, all that renders a man *integer vitæ scelerisque purus*, may be possessed in the highest degree, without affording very striking features for such an article. What says the poet?

> Full many a gem of *purest ray serene*,
> The dark unfathom'd caves of ocean bear;
> Full many a flower is born to blush unseen,
> And waste its *sweetness* on the desert air.

But those gems that are concealed in the deep caves of the sea, and the modest flowers that blossom in desert places, are not less bright, or sweet, or admirable, because they are not seen of the world—and those men, whose excellent and rare worth might make them the admiration of the age, are not the less admirable, if, with a virtuous modesty or christian humility, they retire from the stark stare of the public, preferring to exercise in a quieter sphere their excellent virtues, until confirmed by time and experience, they with more confidence may claim the high places of honour and respect. Virtue, in their view, is not a meteor, to flash out brightly and straightway be seen no more; for bad men occasionally do good actions; but it is a steady and a shining light, whose beams are mild in the orient, and grow broader and brighter and more beneficial, until they attain a meridian perfection and excellency. Those men only who *pursue* wisdom, and grow daily in goodness, are entitled to our admiration and praise. If such persons do not become what is called great, it is because circumstances make men great, and not that great men create circumstances for themselves. Such genius and

public virtues as are found to be common and almost trite in times of great political convulsions and revolutions, ought not to be considered as rare or uncommon among men; for multitudes of persons pass their lives in vile trades, or squander their time in humble pursuits, who only require favourable circumstances to enable them to advance science, adorn the arts, or fill the rolls of fame with the history of glorious actions: the same is true of physicians, whose greatness oftener depends on contingencies than on their own pre-eminent qualifications, The occurrence of terrific epidemics, or fortunate appointments to public stations, are frequently the causes which lift men far above their equals in talent or worth.

After all it might be asked, what is it that makes men worthy of imitation when living, and of reverence and regret when dead? He only is admirable who begins life with unchangeable resolves to discharge his relative, social, and religious duties, and who in the course of that life, brings constantly up to the mark in performance, what he had aimed at as the prize in promise. The common fault is, that men go on by a sort of rule of chance-medley, have no fixed or predetermined objects or motives, and yielding to the impulse of events, are ever swaying up and down, and come therefore to nothing good. A man may begin with a general resolution that he will lead a moral life; but he is not half so apt to escape the snares of temptation, as he who firmly determines to eradicate from his soul the particular seeds of pride, envy, malice, avarice, &c. The very definiteness of the plan ensures its fulfilment.

In the death of Dr. EMLEN we have suffered the loss of a man who understood well, and discharged in a high degree, his professional, social, and religious obligations —who had forced his way by sheer merit, without an iota of false pretences or shrewd policy, into the public favour.

Dr. EMLEN was born in Chester county, state of Pennsylvania, on the 6th of March, 1789. As springing from one of the oldest and most respectable families of the society of Friends, he received, of course, in his early education, all the advantages which their strict example and sedulous inculcation of good morals could bestow. His education was chiefly English, but as it was carefully superintended, he had in it a solid foundation of knowledge, on which he afterwards erected a considerable structure of various and available information. The flash and gewgaw of education were never very desirable nor pleasing in his eyes, inasmuch as he knew them to be unessentials in managing the solid and stern concerns of life; and herein he conformed to the practice of the religious body of which he was a member, who, though they despise not many of the elegant pursuits of literature, and often combine in a high degree the agreeable with the useful, are more given to the latter than to the former. Dr. EMLEN's acquirements were more solid than specious, and produced in him those excellent fruits which have caused his death to be so much regretted.

In the year 1808, having resolved to devote himself to the profession of medicine, he placed himself as house pupil with Dr. PARRISH of this city, and under his roof, and with his example constantly before him, made rapid progress in his studies, to which by the testimony of his teacher, he absolutely devoted himself.

Under the roof of Dr. PARRISH, and as a member of his family, Dr. EMLEN passed four years, during which, having attended the lectures delivered in the University by the professors RUSH, WISTAR, BARTON, PHYSICK, JAMES, and COXE, he graduated M. D., and in June, 1812, embarked at New-York for England.

Arrived at London in the month of July, he placed himself in the vicinity of one of the great hospitals, where he sedulously endeavoured to acquire the greatest amount of practical and surgical knowledge. Attendance on hospital practice, on lectures by the celebrated individuals whose reputation had attracted him thither, conversation with celebrated men, to the houses of many of whom he had free and familiar access, and visits to objects which interest the man of science or the philanthropist, kept his mind on the stretch; and he accumulated a large stock of information, of which he noted down the heads in his journal; which we have perused with great satisfaction, as affording evidence of the diligence with which he employed himself even at that period.

The declaration of war by the United States against Great Britain, which reached London soon after his arrival, placed no obstacles in the way of his studies while in the metropolis. The detention it occasioned gave him an opportunity, however, of making an extensive tour through England, Ireland, and Scotland, the history of which is detailed with considerable naivete in his journal. At length the obstacles to his visit to Paris were removed, and after a residence of fourteen months in the island, he reached that city about the time of the emperor's return from Leipsig.

His stay in London, and his frequent access to the society of the most eminent physicians, surgeons, and lecturers, had increased his stock of knowledge, while the elegant society in which he moved, although it never abolished the gravity of his carriage, or the serious and sententious style of his conversation, imparted nevertheless to his manners that urbane cast, which is far more estimable and trustworthy than the false and heartless elegance of mere fashionable intercourse. They were marked by the gentleness, self possession, and confidence which belong to the gentleman.

In Paris, though daily attracted by the extraordinary events of that wonderful period of history, Dr. Emlen continued to attend mainly to the objects of his visit.— The battles fought in the vicinity filled the hospitals with soldiers suffering under every species of military accidents, which he carefully studied.

As we have no events of his history while in France, demanding a particular relation, we need here only state that after the surrender of the French capital he returned to London in June, from whence he proceeded to Holland, and came home in the corvette John Adams as the bearer of despatches to the Government, after an absence of nearly two years and a half.

Soon after his arrival he commenced the practice of physic, and was elected one of the physicians to the Philadelphia Dispensary; an excellent school of practice through which most of the eminent practitioners here have passed.

In 1819 he resigned this station, in consequence of increasing occupations; soon after which he was elected to be one of the managers, and finally, after the death of his revered friend Dr. Griffitts, became secretary to that charity.

During the year 1819, when the yellow fever prevailed along the water margin of the city, Dr. Emlen was secretary to the Board of Health, and made those observations, of which the fruit is to be found in his valuable paper on yellow fever published in the last number of this Journal.

As member of the Board of Guardians of the Poor, as physician to the Magdalen Asylum, the Orphan Asylum, and the Friends' Asylum for the Insane, he established broadly and deeply the foundations of a reputation which tended daily to raise him in public esteem.

He was an efficient and respected member of the Kappa Lambda Society; and the Journal of that Association is much indebted to him for the usefulness and reputation it has attained. He succeeded Dr. Griffitts as secretary to the College of Physicians, and to his zeal is undoubtedly owing much of the renewed activity and efficiency which marks the present course of that institution.

In 1825 he was elected one of the physicians to the Pennsylvania Hospital, an office to which he was annually re-elected, a sufficient proof of the assiduity and ability with which he discharged the functions of that honourable and very responsible situation.

This excellent man sat not down contented with the discharge of his merely professional duties. He had ac-

quired very solemn impressions of the magnitude of the evils which the vice of drunkenness has brought on the country, and few persons, although much attention has been given to it by some of the foremost men of the time, had accumulated more of statistic knowledge on the point than himself. In the organization of the Pennsylvania Society for Discouraging the use of Ardent Spirits, as well as in its administration as Manager, he took a very active and discreet part.

Dr. Emlen's private business occupied a very large share of his time. It had augmented rapidly during the last few years of his life, so that, with his public and private affairs, he had little leisure for visits of ceremony, or for any waste of that time which in his eyes was so valuable.

We have said that a physician's life for the most part furnishes few materials for the biographer: and yet, could we trace step by step so good a man's walk; behold him as he carries into the haunts of sickness, pain and despair, the healing influences of his function; see him at the bed side of the declining and dying, calling the careless or amazed senses to a just consideration of the duties of the creature towards the Creator; could we feel each throb of that sympathizing heart, or sum up the numerous alms-givings of that ever open hand,—what more should we need of events, to grace his memory or make his history interesting? The mad ambition of a conqueror may drive his headlong squadrons from the Granicus to the Indus over prostrate rights and bleeding bodies—may gather trophies, and wear them; but in the eye of sober reason and reflection, such are not half so lovely, so good, so beneficial in their day as the ceaseless and noiseless triumphs of a good physician, whose christianity adorns and at the same time is illustrated by a blameless life.

Dr. Emlen was a christian: those who knew him will appreciate this praise. His religious diary, commenced in 1823, was continued up to the day preceding the invasion of his last illness, and contains a faithful, candid transcript of his feelings and views concerning the immortal hopes and desires that he experienced. It affords the evidence of that strained anxiety for improvement in morals, which he seems to have made a regular part of his plan, and of which he never lost sight in his conduct or conversation. We ought to remark that during his absence in Europe, he had been so much in the world as to have omitted some degree of that rigid observance of *plainness* that marks the dress and manners of Friends; but as his mind began to be more and more impressed with his religious obligations, he became more conformed to the practice of his society. His diary has an entry relating to the change he had effected in dress and demeanour, which was made for the purpose of enabling him, with less embarrassment or inconsistency, to live up to the requisitions of his conscience.

He quotes an observation, "we become christians more speedily by changing that which is within than that which is without;" and subjoins, that in order to enable him to restrain his conduct with less hesitation within the bounds of the cross, and feel as though he had no plea for appearing to act as a worldly man, he had assumed that plainness of stile which he doubtless considered as customary and useful aids in the christian warfare.

In the year 1819, he married Beulah Valentine, who was like himself a member of the Friends' Society. In the tender relations which this union produced, he found the purest sources of happiness. To his children he bore an affection that might be called passionate. We presume to say that the fire of parental love glowed in his breast with redoubled intenseness, perhaps because of the habitual restraint under which he was accustomed to hold his passions: how lamentable must have seemed the stroke which divided him in this world from the care and watchfulness over his children, which appeared to be, for him, the best part of existence. Nevertheless, in committing his family, as he did, on his death bed, to the providential care of his Maker, he seemed to have acquired a calmness and submission that permitted no murmuring word to escape his lips, nor allowed of one sign of impatience or wilfulness, to express his unwillingness to meet that fate for which he was prepared by a blameless life.

From the American Medical Review.

CASE OF A HORNED WOMAN.

Marlborough, Montgomery Co. (Pa.) 10th July, 1826.

Dear Sir—I take the liberty of forwarding for your perusal the following case of an horned woman, hoping that from its very rare occurrence, it may not prove unacceptable. The account may be relied on, as many others besides myself have seen her, and as she resides but five miles distant from this place.

Mrs. B—, aged about seventy years, the wife of a farmer of Bucks county, of a robust constitution, was affected four years ago with a very troublesome itching over the centre of the parietal bone of the left side. In a short time she perceived a hard tumour of a horny structure occupying the place thus affected, which continued to increase, so that by the end of twelve months it had attained the length of one inch. Without any considerable pain, it has progressed in its growth an inch every year, and is at present four inches in length, and as thick as one's little finger. It is not attached to the bone, but is evidently an affection of the cuticle, commencing with a granular hour-glass-shaped tumour of three-eighths of an inch in length, from which the horn abruptly rises. After growing straight for one inch and three quarters, it takes a spiral direction, and has completed nearly a circular turn and a half horizontally, of about the diameter of a quarter dollar piece. In appearance it so closely resembles the horn of a buck sheep, that was it placed near a real sheep's horn, it would be difficult to distinguish between them. It is of the same colour, a dingy yellow; is as perfectly hard, and has all the rings natural to a horn of that animal, tapering also as it does, to the end. As it occasions no pain, except when a blow compresses its fleshy base between the horn and the bone;—as it is perfectly concealed by her head dress, and on account of what is of far more moment with her, a superstitious belief that it is a judgment from above, for some of her manifold sins, she resists all persuasion to have it removed.

With sentiments of gratitude, I am yours, &c.

Dr. B. Rush Rhees. GEO. R. MORTON.

[The Hon. William Keith, Esq. had been appointed Govr. by ye Proprietor *wth consent of ye Crown*, as the Charter required. Mr. Penn Junr. after his father's death, had given him a Commissn as Govr. *without* that Consent; Keith doubted the Propriety of acting under it, and stated the case to Secry Craggs, who submitted it to the Lds Justice and they to the Lords of Trade and Plantations; upon this occasion the following Letter was written, and Keith's Scruples approved.]

Extract from a Letter from the Lords Commissioners for Trade and Plantations (dated Whitehall July 21st, 1719," and signed, "J. Chetwynd, Charles Cook, T. Pelham, Martin Bladen,) to the Lords Justices of England.

"We think it our Duty, upon this Occasion, to acquaint your Excellencies, that we have been informed there was formerly an agreement made between her late majesty and Mr. Penn for this Province, and that Mr. Penn did receive part of the money in pursuance of the said agreement; We are not able to judge how far it may suit with the present Condition of his Majesty's affairs to compleat this agreement; but we cannot help thinking, that all occasions should be laid hold on to recover at least the Dominion of all the Proprietary Colonies into the Hands of the Crown."—*Records of Council.*

AN ABSTRACT OF THE

RETURNS MADE BY THE COMMISSIONERS OF THE CITY OF PHILADELPHIA

AND THE SEVERAL COUNTIES OF THE COMMONWEALTH OF PENNSYLVANIA,

In pursuance of a requisition of the Committee of Ways and Means of the House of Representatives of the said commonwealth; and printed by order of the said house.

To this Abstract is added, the date at which the several Counties were laid out—the number of Taxable Inhabitants in each—and the value of Real Property in the said City and Counties respectively—adjusted by the said COMMITTEE so as, in their opinion, to form a good Rule for Apportioning amongst them any TAX that may be ASSESSED upon the Real Estates of the Inhabitants of this State.

The 12th, 13th, and 14th, columns are incomplete, in consequence of the imperfect Returns of the commissioners.

The commissioners, in their Returns designating the quantity of Land of first, second, third, and fourth rate, in their respective Counties, had no reference to land in their neighboring Counties,—hence no judgment can be formed by a comparison of what is called first rate in one County with that of the same rate in another: For what is termed first rate in one County, would hardly be fourth rate in another. And so of the other rates.

After making the usual allowance for roads and highways, and ample allowance for rivers and rivulets, there will be something more than a million and a half of Acres unaccounted for.

N.B. The Commissioners of the counties of Indiana, Jefferson, Potter, Tioga and Schuylkill, having made no Returns, the Committee have supplied the defect by an estimate of the quantity of Land in each of those Counties.

Date of Counties.	*Names of Counties.*	*Taxable Inhabitants for 1814.*	*First rate land.*	*Assessed value per Acre.*	*Second rate land.*	*Assessed value per Acre.*	*Third and fourth rate land.*	*Assessed value per Acre.*	*Average value per Acre.*	*Total quantity of Acres in each County.*	*Unseated Lands included in the preceding column.*	*Amount of Assessed value of Lands.*	*Assessed value of Personal property.*	*Amount of the Assessed value of Real and Personal property in the City and several Counties.*	*Adjusted average price per Acre by the Committee of Ways & Means*	*Amount of the Value of the Real Estates in the City and the several Counties, as Adjusted by the Committee of Ways and Means.*
At commencement of the Provincial Government.	Philadelphia city	9383	—	—	—	—	—	—	—	—	—	—	—	$28231938	—	$28231938
	Do. county	10486	2484	$200	19872	$120	$2165	35 to65	$79 16	74521	—	—	—	18390804	$120	18390804*
	Bucks	7066	14472	75	260419	50	86913	8 24	43 64	361804	—	—	—	15792193	36	13024944
	Chester	8072	—	100 to 150	—	—	—	3 50	55 05	412537	—	$22710280	1233103	23943383	37	15263869
1729	Lancaster	11346	169380	64	254071	47	84691	10 29	42 83	508142	—	21768295	6785284	28553579	48	24390816
1749	York	6772	40909	40 to 75	34844	20 to 40	404308	1 20	17 70	480061	—	8500079	—	8500079	30	14401830
1749 1750	Cumberland	5971	7682	80	166454	37½	324044	75 18 21	23 25	498180	—	11584059	—	11584059	31	15443580
1752	Berks	7390	100000	60	160000	40	260000	5 20	32 28	520000	—	16790000	—	16790000	35	1820000

1752	Northampton	4523	80044	30	70	71119	15	30	208522	3	to 15	0	18 71	369694	——	——	——	6919034	30		11090820
1771	Bedford	3351	27206	4 33		54412	3		747779	0 10	1 46		1 27	816181	——	——	——	1034907	5	0	4080905
1772	Northumberland	1687	326	67		——	—		174066	0 50	&c.		9 45	174393	40074	1647398	——	1647398	12	0	2092716
1773	Westmoreland	5370	39097	9	12	169421	6	8	299745	0 50	5	0	4 51	508263	50739	——	——	3016057	7	50	3811972
1781	Washington	6780	——	25		——	—		——	——			6 50	487458	——	3168447	1118792	4287269	8	0	3899664
1783	Fayette	4579	95277	9		79605	6		224563	1 74			6 41	399445	——	2520497	149927	2711371	7	50	2995837
1784	Franklin	4493	63894	68		95842	50		223629	5 0	25	0	29 28	383366	——	——	——	11266642	30	0	11500980
1784	Montgomery	6221	45396	40		125285	38		112532	19 0	33	0	30 48	283213	——	8632332	606892	9239224	33	0	9346029
1785	Dauphin	3348	6000	150		38199	80		184998	0 50	15	0	42 22	229197	——	——	——	9676727	30	0	6875910
1786	Luzerne	2379	4860	28		17717	15		827854	1 0	15	0	1 75	850431	——	1465417	——	1465417	7	0	5953017
1787	Huntingdon	3502	44957	20		104797	12		431484	0 6½	4	0	5 50	581238	——	3196809	367737	3564546	10	0	5812380
1788	Allegheny	5538	12200	25		36600	15		353745	1 0	6	0	6 00	402545	——	2364680	353745	2718425	7	50	2817815
1789	Mifflin	3063	15586	30		69117	21 79		281408	0 25	17	0	10 38	350425	——	3265438	374156	3639594	12	0	4205100
1789	Delaware	2661	——	64		——	—		——	41 0			51 0	105037	——	——	——	7029160	50	0	5251850
1795	Lycoming	1858	14800	7	to10	100374	1	4	991885	0 50			0 75½	1107023	938761	836492	176542	1013036	3	0	3321069
1795	Somerset	2191	10744	6		28497	5		616198	0 25	4	0	2 82	655439	——	1851400	——	1851400	5	0	3277195
1796	Greene	2412	17425	11		69699	9		174248	1 50	5	0	4 24	261372	——	1110511	——	1110511	5	50	1437546
1798	Wayne	551	150	20		2950	12		356746	0 25	5	0	1 11	359846	——	——	——	529788	3	0	1079538
1800	Adams	2979	30836	40	&c.	149081	25	40	93712	1 0	25	0	25 0	273629	——	6840725	1629668	8470393	25	0	6840725
1800	Centre	2150	11139	20		23698	18		719146	0 25	16	0	3 77	753983	505384	——	——	2713586	10	0	7539830
1800	Beaver	2398	56688	5	to6	181625	3	4	95254	0 50	1	50	3 15	333561	——	1051829	195370	1247199	5	0	1667805
1800	Butler	1491	33716	3	15	160520	2 24		235824	0 73	1	45	1 76	430060	——	756905	157703	914608	3	0	1290180
1800	Mercer	1734	14052	3	50	135501	2 30		319479	0 50	1	63	1 68	465032	——	——	——	809542	4	25	2092644
1800	Crawford	1184	11189	6		145797	2 55		367627	0 70	1	30	1 73	524613	——	856072	81267	937339	3	0	1573839
1800	Erie	858	54247	2	37½	216990	1 87½		162744	1 12	1	44	1 72½	433980	——	739155	62000	801155	3	0	1301940
1800	Warren	216	36275	1	to2	145102	0 75	1	253930	0 25	0	75	0 70	435307	——	——	——	310284	1	75	761787
1800	Venango	673	50067	1	to2	200272	0 75	1	350473	0 25	0	75	0 65	600810	——	——	——	394418	2	50	1502025
1800	Armstrong	1454	481	4		804	3 50		539271	0 6½	3	0	1 14	540556	229935	——	——	473266	3	0	1621668
1803	Indiana	1363	——	—		——	—		——	——			——	440000	——	——	——	1320000	3	0	1320000
1804	Jefferson	35	——	—		——	—		——	——			——	650000	——	——	——	975000	1	50	975000
1804	M'Kean	63	2252	2		6585	1 50		730328	0 50			0 52	739165	730328	——	——	382810	1	50	1095492
1804	Clearfield	264	——	3	to5	——	2	4	——	0 12½	3	50	0 71½	831808	——	——	——	595538	2	0	1663616
1804	Potter	50	——	—		——	—		——	——			——	575000	——	——	——	1006250	1	75	1006250
1804	Tioga	455	——	—		——	—		——	——			——	630000	——	——	——	1417500	2	25	1417500
1804	Cambria	521	4100	3		6700	2 75		475560	0 12½	2	50	0 94	485360	——	——	——	458301	2	0	970720
1810	Bradford	1493	5780	9	46	46000	7 73		557840	1 0	5	0	2 12½	609620	——	1292983	——	1292983	3	0	1828860
1810	Susquehanna	1242	16800	30		13386	24		423384	0 50	20	0	1 67	453520	——	746366	12883	759249	3	0	1360560
1811	Schuylkill	1614	——	—		——	—		——	——			——	450000	——	——	——	4050000	9	0	405000
1812	Lehigh	2902	29319	50		48292	45		108369	24 0	32	0	39 16	185980	——	7283280	——	7283280	40	0	7439200
1813	Lebanon	2696	30940	76		29050	58		82354	16 0	33	0	53 89	143344	——	7863623	——	7863623	52	0	7453888
1813	Union	2772	14818	40		29069	25	30	173781	1 0	25	0	17 32	215507	——	3732658	——	3732658	20	0	4310140
1813	Columbia	3349	520	40		2900	35		268679	0 50	30	0	12 94	272099	——	——	——	3519776	15	0	4081485
1814	Pike	473	5423	12	to20	4965	5		611673	0 ½	&c.		0 54	626061	——	331733	——	331733	0	75	469552
														23278806							301842830

* This sum includes Lots and Houses in the Northern Liberties, Southwark, Germantown, &c. &c.

Signed on behalf of the Committee of Ways and Means.

Harrisburg, March 1, 1815.

JACOB BUCHER, Chairman.

EXTRACTS OF AN ORATION

Delivered at the Church in Manayunk, July 4, 1828, by Dr. J. A. ELKINTON.

* * * Let us look back for a moment and compare the condition of our country at this time, with what it was twenty years ago. I well remember, at the winter fire-side, hearing my father recount the dangers and the trials in crossing the Allegheny, and the almost insurmountable difficulties which he and his fellow travellers experienced in 1800, during a western expedition. The high and imposing summit of the mountain threatening to overwhelm them on one side, and the deep daring precipice, which looked down hundreds of feet over rocks and sharp ledges of stone, on the other.

No *turnpike* which now levels the irregularities of the mountain with that of the plain, was known to them at that time.

What were the resources of the farmer who inhabited the upper counties along the head waters of the Susquehanna? And how appalling were the prospects of the husbandman in that quarter, in obtaining a ready market for the produce of his soil.

When the waters of the Schuylkill moaned their uselessness, and those of the Susquehanna knew no attachment to its sister stream. Now mark the connection; one long chain of *canals* links together the different streams; and the hearts of the people, like their waters, are mingled in peace.

Of what utility was the discovery of the coal mines at Mauch Chunk, or the endless supply of that valuable article of commerce, in the mines of Mount Carbon. Situate more than a hundred miles from the place of its principal consumption in regard to domestic purposes, how was the citizen to be benefitted by the disclosure of this important provision of Providence, secreted in the bowels of the earth, for the comfort of, and left to be developed by, the industry and ingenuity of mankind. The immense quantity of coal which is deposited beneath the surface of the earth is truly astonishing.

Applied to the purposes of fuel, the stone coal is consuming day after day in invaluable quantities; and so great is the store laid up for our use, that there is no probability of its being exhausted for ages yet to come.

Supposing its formation to be owing to the deposition of marine animal matter, as is asserted by some, the same process must be still going on; and the inmost recesses of the present seas, may be receiving the materials of fuel, for the inhabitants of new continents in the most remote period of the world.

"Nature profusely good, with wealth o'erflows,
And still is pregnant, tho' she still bestows."

The question is answered by a knowledge of the great trade of the Schuylkill canal, and by the facilitated advantages of the rail road at Mauch Chunk.

Look too at the advantages derived in New York as well as in this state from canals. Where the forest lately frowned, now the ploughshare glitters, and the harvests wave in verdant beauty! Where the dark and impenetrable ravine affrighted the traveller, the song of the husbandman now cheers him on his way! Swamps of lonely dreariness are changed to rich and lovely landscapes, and the march of human industry treads gently over their surface, and silently proclaims the civilization of the west. The howl of the retreating wolf, and the midnight shriek of the panther, are usurped by the morning song of birds! Such are some of the fruits of internal improvements, by the medium of canals.

Who is the man among this large collection of people, that credited the prophecy, or would have supposed that America twenty years ago, would be able at this time to supply her own wants in all the various branches of Manufactures?

Contemplations and prospects like these, elevate the feelings, cement the affections, ennoble our national character, and create in us a spirit of unusual industry, guaranteeing independence of all foreign countries alike honourable and dignifying.

Our domestic manufactures, our canals, our rail roads, progressing as they do, and as we do as a nation, backed by the powerful dependence of a vast and fertile territory, kindles in us a sensation truly republican, a spirit of enterprise and patriotic pride, which holds forth the bold prospect of triumph and ultimate success.

We will take for example a brief sketch of our own village, analyse the circumstances of what is before us, and take a retrospect of the past.

I am indebted to Mr. Andrew Young, for the following animated description, which was published some months ago, containing a list of the Factories in the order which I shall give them.

The changes which enterprise and capital are effecting in every portion of our country, are in many instances so rapid, as to appear almost beyond the limits which we are accustomed to prescribe to the efforts of human labor, and to make us think that the story of the lamp of Aladdin, by which he managed to erect a palace in the course of the night, is not so wonderful a matter, as we were wont to consider it.

It seems comparatively but a few months since, in our favorite ramble along the banks of the Schuylkill, for half a dozen miles above the city, we were accustomed to meet with nothing more imposing than a gentleman's country seat, or an occasional farm house. To hear nothing save perhaps the heavy sound of a flail, wielded by some veteran thresher; or the clamourings of truant urchins, as they sported upon the bosom of our placid and romantic river. But now five miles from Philadelphia, where calm waters reflected only the stately chesnut or nodding cedar, we have the broad shadow of the cotton factory, and the swift rushing of the water as it hurries away from the mill wheel. The whole scene is changed. A flourishing and populous village has risen up suddenly, and where we but lately paused to survey the simple beauties of the landscape, the sloping hills, the green woods, and the winding river, the eye is arrested by the less romantic operations of a manufacturing community, and the ear filled with the noise of ten thousand spindles." The following is a list of the establishments as they were six months ago.

1st. Richards, Rush, & Co's cotton factory is the upper mill, has 3,300 spindles, and 60 power looms, manufactures 10,000 yards per week, employs 115 hands.

2d. Is a grist mill, belonging to Schmick and Gorgas, manufactures 300 barrels of flour per week, employs 5 hands.

3d. Mr. Rowland's mill, for grinding and polishing saws; employs 9 hands.

4th. Mr. C. Hagner's mill, grinds drugs, cards and spins wool, and fulls cloth; employs 20 hands.

5th. Mr. Darrach's mill, manufactures wool for hats in one part, and cards and spins worsted in the other part; employs 55 hands.

6th. Mr. Rising's mill, has 2000 cotton spindles, and 30 power looms; employs 75 hands.

7th. Mr. Brooks' mill, has 8 power looms in one part, manufactures patent wool for beds in the other part; employs 12 hands, (has 400 spindles now in operation.)

8th. Mr. McDowell's mill, manufactures paper in one part, and has 1000 cotton spindles in the other part; employs 45 hands.

9th. Borie, Laguerenne, and Keating's cotton mill, has 4,500 spindles, and 120 power looms, manufactures 20,000 yards per week; employs 215 hands.

10th. Mr. Morris' mill, has 3,364 cotton spindles, employs 75 hands. This mill is now conducted by its present owner, Mr. Wagner.

Making 636 hands employed in the manual operations of the mills.

In addition to the above list, there is now building, and will be completed this season—

1st. By Mark Richards, Esq. a rolling mill, and nail factory, adjoining the cotton factory.

2d. By Mr. Shippen of Philadelphia, three other factories, whose use is not at present ascertained.

3d. By Mr. Eckstein, a large paper mill, which will require 40 hands.

4th. By Moses Hay, a mill for the manufacturing of woollen and worsted goods.

A friend has politely furnished me with the following interesting information:—

"Capt. John Towers' was the first mill started on the bank—began running November 10th, 1819.

Mr. Isaac Baird was the first to start manufacturing. The first child born in this village was Christiana Margaret Baird, born January 23d, 1820.

The name of Manayunk, is intended as the Indian name of the river Schuylkill. But on the authority of Peter A. Duponceau, Esq., the name ought to be Manajunk; signifying in the Delaware language, daughter of rivers—meaning it was one of the daughters of the river Delaware.

Other buildings of less magnitude are going up in every direction. Some have it, that a town to be called Jacksonville, is in agitation, at the upper end of Manayunk.

There is at this time a constant demand for mechanics of every description, and good wages offering for labourers, by the people of this place. Stone masons particularly, mill-wrights, machine-makers, and carpenters, would all find plenty of employment here at this time. There is also a demand for hands in the factories. The following notice which has appeared in the Philadelphia papers, expresses the thriving state in which every branch of business is going on: "In addition to the great demand which at present exists in the interior of the state for labourers to complete the canal contracts, we learn from a gentleman well situated to judge, that the manufactories in the vicinity of the city are in want of hands, 'mule spinners' and weavers in particular, may make good wages, the former about two dollars per day." "*

What can be more gratifying to the advocate of national independence, and the friend of domestic improvement than to behold an arrangement of factories animated by hundreds of inmates who attend to the operations of the machinery.

This church yet unfinished, is the imposing monument of the growing state of religion and morals among us. Here the precepts of the gospel are regularly administered.

I shall doubtles be excused if in this place I call to your remembrance, the indefatigable exertions of our absent and mutual friend, the Rev. Mr. Van Cleef. He first consecrated these walls, with the wholesome truths of religious instruction. Having in view the welfare of his fellow men, he enforced in language not soon to be forgotten, the great and unerring principles of religion and virtue. To his labours we may deservedly attribute the improving state of morality and religion in this place. His services will not go unrewarded. The people of Manayunk will continue to remember him with feelings of love and gratitude. While we unite in the expression of universal regret for the necessity of his leaving us, we are all eager to acknowledge an exalted and unfeigned appreciation of his professional abilities and righteousness, as well as an unqualified admiration and love for his talents and virtue.†

More than half a million of dollars is invested in the manufacturing interest of this place. An average sum of ten thousand dollars is paid away every four weeks for labour. The cash is put in immediate circulation. It comes from the employer to the hands; from the hands to the store-keeper, the butcher, the baker, the taylor, the shoemaker, the truck merchant, and the doctor all get their share. A new and vigorous spring is given to every thing.

By a recent census the population of Manayunk amounts to thirteen hundred and ninety-four souls. It is supposed that two thousand people subsist at this time out of the operations and improvements, that are going on within the boundaries of Manayunk. The whole village is a kind of theatre, in which hundreds of people, composed of different countries, are grouped together, and each performs his part. In addition to the church, there is a school for free and pay scholars of both sexes, besides several other seminaries of learning.‡ The "Roxborough Lodge" constitutes a prominent part of our local improvements, and may be considered a valuable acquisition to the place. In its government, good order and harmony, with a remarkable degree of brotherly affection, characteristic of the fraternity, is found to exist. It is equally respectable with other similar institutions.

To what does Manayunk owe all this rapid and prosperous advancement? Six years ago, in a state of embryo, and comparative nothingness, no enterprising traveller sought the shores of the Schuylkill in this direction. Now we are becoming the wonder of the old, as well as of the new world. Rising up in a remarkable manner, we have received the appropriate and highly complimentary appellation, of the Manchester of America.

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* The committee consider themselves authorized to contradict the publication which speaks of "mule spinners" making two dollars per day. In the vicinity of the city "mule spinners" can make on an average from six to nine dollars per week."

† We are correctly informed that the Rev. Mr. Sears, of Philadelphia, was among the first to establish the church. Aided by some of his friends in the city, as well as with the co-operation of the people in this quarter, it has rapidly progressed.

Mr. Sears officiated in the exercise of the ministry a long time before Mr. Van Cleef came to the place. He still continues his professional services among us—prayer meetings and the Sunday school, find in Mr. Sears a faithful advocate and a zealous friend. What we have said of Mr. Van Cleef, may be very justly applied to his acknowledged friend and fellow labourer, Mr. Sears.

‡ A library has lately commenced among us, and promises to be a means of much usefulness and improvement. It has already received unanticipated patronage and support.—AUTHOR. *Pen. Gaz.*

JOHN SCOTT'S LEGACY.

JOHN SCOTT, Chemist, late of Edinburgh, by his will, made in the year 1816, bequeathed the sum of four thousand dollars in the funded three per cent. stock of the United States, to the Corporation of the city of Philadelphia, to the intent, "that the interest and dividends to become receivable thereon, should be laid out in premiums to be distributed among ingenious men and women, who make useful inventions, but no such premiums to exceed twenty dollars; and that therewith shall be given a copper medal with this inscription: '*To the most deserving.*'" The Select and Common Councils, by an ordinance passed November 22d, 1821, intrusted "*The Philadelphia Society for promoting Agriculture,*" with the distribution of the aforesaid premiums and medals, for the term of five years; and on the 25th January, 1827, they renewed the ordinance for a further period of seven years. Successive committees of the Society were appointed to attend to the business, by which the following premiums have been awarded.

1822.

I. To Samuel Goodwin, for a Front Door Lock—twenty dollars.

II. To Dr. James Ewing, for a Screw-cock Hydrant—a medal and twenty dollars.

III. To Coleman Sellers, for a simple and effectual Cupping Instrument—a medal and twenty dollars.

IV. To Thomas Barnitt, for a press to force out the unnecessary quantity of tar absorbed by yarn, in the manufacture of cordage—a medal and twenty dollars.

V. To Isaac Conard, of Lampeter township, Lancas-

ter county, Pennsylvania, for a simple and effectual Barrow to plant Indian corn—a medal and twenty dollars.

VI. To George Harper, for two Drills, one for potatoes and one for seeds—ten dollnrs.

VII. To Wm. Shotwell, for an easy garden weeder—five dollars.

VIII. To Robert Welford and James H. Deas, for an improved plane with frictionless rollers, for planing floors—a medal and twenty dollars.

IX. To Daniel Neill, for a Vertical Printing Press—a medal and twenty dollars.

X. To James Gardette, dentist, for three mechanical improvements in his profession; which are highly commended in Europe and the United States; and for a simple Lever instrument, for the easy and expeditious extraction of teeth, and stumps of teeth—a medal and twenty dollars.

XI. To Jonathan Nicholls, of Providence, Rhode Island, for a portable Carriage Spring Seat—a medal and twenty dollars.

XII. To John Meer, for a Razor Strop—a medal and twenty dollars.

XIII. To Mrs. Frances Jones, for an improvement in the apparatus for making patent lint—twenty dollars.

1825.

XIV. To Benjamin Freymuth, for a very ingenious Chamber Alarm Bell, which can be attached to a watch—a medal and five dollars.

XV. To John C. Jenckes, of Providence, Rhode Island, for an Apparatus to enable persons with fractured limbs to be moved in their positions in bed, without injury—a medal and twenty dollars.

1827.

XVI. To Robert Eastman, of Brunswick, Maine, for an Improved Rotary Saw-machine, for sawing clap boards—a medal and twenty dollars.

XVII. To Joseph Woodhouse, of Otsego county, N. York, for a Paper-cutting Machine—a medal and twenty dollars.

XVIII. To Abraham Corl, of Pugh town, Chester county, Pennsylvania, for a Drill for clock and watchmaker's work—a medal and twenty dollars.

XIX. To Joel Taylor, of Danbury, Connecticut, for an Apparatus for dying Hats—a medal and twenty dollars.

XX. To Daniel Powles, of Baltimore, for a Bedstead which can be put up and taken down by any person, owing to the peculiar construction of the joints, and is proof against insects.

XXI. To Danl. Powles, for a Stirrup, which effectually prevents the foot from sticking, in case a person is thrown from a horse—a medal and twenty dollars.

XXII. To James Cooper and Thomas Barnitt, for a Hat-finishing Apparatus—a medal and twenty dollars.

XXIII. To the Messrs. Terhoeven, brothers, of Philadelphia county, for an Apparatus which winds the silk from the cocoons, and twists and doubles it at one operation—a medal and twenty dollars.

All the inventions for which premiums have been awarded, are in actual use, and highly approved of.

The Committee invariably require certificates of the originality and utility of the inventions, or improvements for which claims for premiums have been made: and descriptions of them correctly written, and in clear language, accompanied by drawings in perspective, and in detail when necessary to illustrate them. Models of some of the foregoing machines are in possession of the Society, and the operation of most of them have been witnessed by the committee. Where the invention is a composition of matter, specimens of the ingredients, and of the composition of matter sufficient in quantity for the purpose of experiment, and to preserve in the cabinet of the Society, are required. To these rules of conduct, they, during the last year, added the following, for the purpose of affording every possible chance of detecting any attempt at interference on the part of claimants, with the inventions of others. After having satisfied themselves of the utility of an invention, and resolved that it is worthy of a premium, they advertise that in three months it would be awarded, unless satisfactory testimony should in the mean time be brought forward to prove its want of originality. This regulation, which it is believed is altogether novel, it is the intention of the Committee to continue, as constituting the best guard in their power to adopt against deception.

The present Committee consist of

JAMES MEASE, M. D.
Vice President of the Phil. Ag. Soc.
ROBERT HARE, M. D.
Prof. Chem. Univ. Penn.
JAMES RONALDSON,
President of the Franklin Institute.
S. W. CONRAD,
Lecturer on Mineralogy and Botany.
WM. RUNDEL.
WM. PHILLIPS.

TENTH PRESBYTERIAN CHURCH.

The corner stone of a new church, to be called the Tenth Presbyterian Church of Philadelphia, was laid on Monday last, at the corner of Walnut and Twelfth sts. An address on the occasion was delivered by the Rev. Dr. Green. The site for this temple is well chosen, and, we are happy to add, that such arrangements have been made by the enterprising gentlemen concerned in the work, as to secure its immediate erection.

The whole of the Union Canal Loan 300,000 dollars, was taken at a premium of 4 per cent.

TO THE PUBLIC.

☞The commencement of a new volume, is a favorable period for those who have not yet subscribed for, and who wish to possess, the Register, to furnish us with their names. From an inspection of the volume which has just closed, the plan of the work as well as the manner in which it has been conducted, may be ascertained. And those who are desirous of possessing it from the commencement, may still be furnished, if application be soon made, either in numbers, at the original subscription price, or bound, at the additional price of the binding. Public libraries may also be supplied with the first volume, and the numbers of future volumes retained for them until the close of a volume and then bound and forwarded agreeably to directions. We need further encouragement, to enable us to sustain this work, and we hope we shall not be disappointed, in our appeal to the public spirit of our citizens, to support and patronize a publication, expressly devoted to the developement of the resources of our state, and to the preservation of facts and documents relative to its history and public improvements. No exertions on our part will be spared to render the Register still more entitled to public patronage.

The printing of the Index being not entirely finished, its delivery must be delayed until early in the next week.

Printed every Saturday morning by William F. Geddes, No. 59 Locust street, Philadelphia; where, and at the Editor's residence, No. 51 Filbert street, subscriptions will be thankfully received. Price five dollars per annum—payable in six months after the commencement of publication—and annually, thereafter, by subscribers resident in or near the city—or where there is an agent. Other subscribers pay in advance.